

Courses on accurate measurement of human physique: *SUM - Standardised Ultrasound Method*

The courses are designed for a broad class of addressees including **clinicians** from a range of specialities, **sports medicine physicians, physiotherapists, nutritionists, trainers, sport scientists**, and experts affiliated with **sport federations**. Preceding experience with diagnostic (B-mode) ultrasound (US) is advantageous, but not a precondition. The image evaluation software NISOS-BCA is designed for **WINDOWS** operating systems only.

The goal of the **BASIC** and **ADVANCED LEVEL** courses (usually conducted in one block – within three days, followed by post-course training) is to reach a high level of accuracy and reliability for measuring subcutaneous adipose tissue (SAT) - as described in Müller W. et al. (Sports Med 2020; Br J Sports Med 2016). The **SUM** is described in detail and in final form in a recently published book: Müller W., Fürhapter-Rieger A., Ahammer H., Timothy R. Ackland: *Beyond BMI: Accurate Measurement of Body Composition – A Change of Paradigm* (IASMS, 2025).

To prepare for the course and optimise its efficiency,
we recommend taking your time to study this book thoroughly.
A personal copy is included in the course fee and also serves as the course handbook.

In particular, the Abstract and Key-points of *Chapter III* summarise the most important methodical aspects. The *Discussion* explains why using the **direct** method **SUM** when high-quality data are desired (all other methods are **indirect** – using series of assumptions).

In *Chapter III, Methods Part 1*, the **marking, ultrasound image capturing and evaluation** procedures are outlined. The **REFERENCE VALUES** of subcutaneous adipose tissue for both **athletes** and the **general population** are displayed in Table 1.

In *Methods Part 2*, the background for the **development of SUM** is explained in detail, including the estimation of **SAT mass** based on SAT thickness measurements. Further, the **Mass Index MI**, which corrects the Body Mass Index BMI for body shape, is deduced. Additionally, the set of **anthropometric variables and indices** used by SUM are described precisely.

Chapter I discusses the question *Why Measure Physique?* - in **sports, medicine, and nutrition** - and analyses the **validity, accuracy, and reliability demands** for high-quality data of physique assessment in lean individuals, for detecting minute changes, and for all kinds of scientific and practical purposes where the quality of data determines the quality of conclusions. Further, topics of body composition and health are addressed.

Chapter II is a SUM analysis of the extremely low adipose tissue levels of elite athletes in a weight-sensitive sport (climbing) – which would remain invisible when using any other method. This chapter can serve as a template for future SUM publications in scientific journals.

Supplementary Materials include tables of complete sets of SUM body composition and anthropometry data of groups of elite athletes of various sports and the graphical displays of the extensive data sets used to define the MI for men and women.

First part (BASIC LEVEL): usually **two** course days

Marking of the eight standardised SAT (subcutaneous adipose tissue) measurement sites

Standardised (IASMS), accurate and reliable measurement of anthropometric variables

Getting started with US imaging – basic instrument settings, probe handling skills

Supervised US image capturing (series of eight sites)

Supervised US image evaluation with the NISOS-BCA software

Getting started with the inter-active image evaluation software NISOS-BCA

Meta-data protocol sheet

Quantitative evaluation of ultrasound SAT images: directly measured thicknesses d_I , d_E at the eight sites and sums D_I , D_E (I: fasciae included, E: excluded); SAT patterning; SAT mass in [kg] and in [%] of body mass

Image analysis statistics and terminology

Anthropometric Indices: MI – correction of the BMI for shape; W/h – index of central adipose tissue - estimating ‘years of life lost’, specific purpose indices

Comparison of SUM results, discussion and correction of errors

SUM competency test for the BASIC LEVEL

Second part (ADVANCED LEVEL, part A): usually **one** course day

Usage of all features of the NISOS - BCA software, including export functions

Inter-observer study performed by the participants (part of the competency test)

Comparison of results, analysis of errors and measurement deviations

Interpretation of the obtained data (*collection reports*)

Reference data of SAT for athletes and for the general population

Estimated SAT mass in kg and in percent of body mass, specification of error ranges

Validity, accuracy and reliability of SUM

SAT patterning analyses

Relevance of the SUM adipose tissue measurement in medicine, sports, and nutrition.

Comparison to other methods; error ranges, accuracy and reliability demands.

Contents of the book:

Beyond BMI – Accurate Measurement of Adipose Tissue – A Change of Paradigm

Scientific Journal Publications

Discussion of study ideas and project designs

Discussion of manuscript drafts for scientific publications

SUM competency test for the ADVANCED LEVEL

Third part (ADVANCED LEVEL, part B): post course training

The course fee includes the software license for the additional post-course SUM measurements required for obtaining the **Advanced Level Certificate**.

IASMS-certifications:

Certificates of successful course participation are issued by the IASMS.

SUM course prices:

see COURSE REGISTRATION in the IASMS homepage (www.iasms.org)

NISOS - BCA software prices:

see NISOS homepage (www.nisos.at)